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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/784,021	02/16/2001	Chiaki Terasawa	684.3140	1607

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EXAMINER

SCHWARTZ, JORDAN MARC

ART UNIT PAPER NUMBER

2873

DATE MAILED: 11/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/784,021	TERASAWA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Jordan M. Schwartz	2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 August 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,2,10-13,15-26,28-39 and 50-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 30,57 and 58 is/are allowed.
- 6) ☒ Claim(s) 1,2,10-13,15-26,28,29,31,32,34-39 and 50-56 is/are rejected.
- 7) ☒ Claim(s) 33 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 13, that part of the claim stating, "wherein said field optical system is all constituted by lenses" renders the claim vague and indefinite because the claim depends from claim 1 which discloses field mirrors within the field optical system. For purposes of examination the assumed meaning is "wherein said field optical system comprises lenses".

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 10-13, 15, 17-26, 28-29, 31-32, 35, 37, 39, 50, and 53-56 are rejected under 35 U.S.C. 102(e) as being anticipated by Shafer et al patent number 6,636,350.

Shafer'350 reads on these claims by disclosing the limitations therein including the following: a projection optical system for projecting an image of an object onto an

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image plane (Abstract, Figure 2, column 1, line 10 to column 2, line 39); a first imaging optical system for forming an intermediate image of an object (Figure 2, from lens "L1" to the intermediate image "Imi"); including a first lens unit having positive power (Figure 2, "L1"); a first optical unit having a first mirror for reflecting and collecting abaxial light (Figure 2 with either just "M21" as the first optical unit or both "M21" and "L23" as the first optical unit); a second optical unit having a second mirror for reflecting light from the first mirror to the image plane side (Figure 2, "M22" as the second optical unit); with the abaxial light passing outside an effective diameter of the first mirror (Figure 2); a second lens unit of negative power between the first and second mirrors (Figure 2 with "L22" or "L23" as the second lens unit of negative power); a second imaging optical system for re-imaging as claimed (Figure 2, lenses "L26-L29" as the second imaging optical system); a field optical system between the first and second imaging optical systems for projecting a pupil of the first imaging optical system onto the second imaging optical system (Figure 2, "M23" through "L25" as the field optical system); the field optical system including a first field mirror (Figure 2, "M23" as the first field mirror); a second field mirror (Figure 2, "M24" as the second field mirror); a positive lens disposed adjacent the image plane side of the first mirror (Figure 2 with lens "L24" adjacent the image plane side of first mirror "M23").

It is believed that the first imaging optical system will inherently satisfy the relationship of claim 2, this being reasonably based upon Shafer'350 disclosing group G1 as having a positive magnification (abstract). Shafer'350 further discloses the second imaging optical system constituted by lenses only (Figure 2). It is believed that

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the system of Shafer'350 will inherently satisfy the conditions of claims 11-12, 17-22, and 28, this being reasonably based upon the large ranges claimed, as well as being based upon the similarity in structure to the projection optical system of Shafer'350, and that of the claimed invention. Shafer'350 further discloses the field optical system comprising lenses (Figure 2 re lenses "L24-L25"); the first field mirror comprising a concave mirror and the second field mirror comprising a convex mirror (Figure 2 re mirrors "M23" and "M24"); the first imaging optical system having a lens group of positive power disclosed closest to the object side (Figure 2 re lens "L21"); the first optical unit including a negative lens and the first mirror (Figure 2 with both "M21" and "L23" as the first optical unit); the second optical unit including a lens (Figure 2 with "L22" and "M22" as the second optical unit and "L23" as the second lens unit of negative power); abaxial light from the object passing through a lens of the second optical unit before being incident on the first optical unit (Figure 2); the projection optical system as both side telecentric (column 3, line 51); the projection optical system having a magnification of a reduction ratio (abstract); projecting a pattern of a mask onto a substrate and printing a device pattern onto a wafer (column 1, line 30 to column 2, line 38); the first and second mirrors adjoining along an optical path (Figure 2); and the first imaging optical system, second imaging optical system and field optical system disposed along a common straight line (Figure 2).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 16, 34, 36, 38, and 51-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shafer'350.

With respect to claims 16 and 51-52, Shafer'350 discloses as is set forth above but discloses the second field mirror (Figure 2, "M24") as convex and not concave as claimed. However, Shafer'350 further teaches that "it is preferable" for this mirror to be convex (column 4, line 12) thereby teaching that the mirror can be other than convex such as concave for the purpose of providing the desired light reflection. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the second field mirror of Shafer'350 as concave since Shafer'350 teaches that this mirror can be other than convex, thereby making obvious that it could be concave, for the purpose of providing the desired light reflection.

With respect to claim 34, Shafer'350 discloses as is set forth above but does not specifically disclose a stop within the second imaging system. However, the examiner takes Judicial Notice that it is well known in the art of optical systems to use aperture stops within for the purpose of limiting the light and providing improved imaging. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the second imaging optical system of Shafer'350 as comprising a stop since it is well known in the art of optical systems to use aperture stops within for the purpose of limiting the light and providing improved imaging.

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With respect to claim 36, Shafer' 350 discloses as is set forth above but does not specifically disclose an ArF or F2 laser. However, Shafer'350 teaches that the system uses an excimer laser light source for 157 and 193 nm (column 1, line 57 to column 2, line 39, column 8, line 11). The examiner takes Judicial Notice that it is well known in the art of microlithographic projection lens system that use excimer lasers for light sources of 157 or 193 nm to use Arf or F2 lasers for the purpose of providing the required illumination. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the system of Shafer'350 as using an ArF or F2 laser light source since Shafer'350 teaches that the system uses an excimer laser light source for 157 and 193 nm and it is well known in the art of microlithographic projection lens system that use excimer lasers for light sources of 157 or 193 nm to use Arf or F2 lasers for the purpose of providing the required illumination.

With respect to claim 38, Shafer'350 discloses as is set forth above but does not specifically disclose the second imaging optical system including two mirrors. However, the examiner takes Judicial Notice that it is well known in the art of optical systems to incorporate mirrors into the system for the purpose of folding the optical path and thereby making the optical system more compact. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the second imaging optical system of Shafer'350 as comprising two mirrors since that it is well known in the art of optical systems to incorporate mirrors into the system for the purpose of folding the optical path and thereby making the optical system more compact.

***Allowable Subject Matter***

The indicated allowability of claims 1-2, 10-13, 15-26, 28-29, 31-32, 34-39, and 50-56 are withdrawn upon further consideration by the examiner and in view of the new rejections set forth above.

Claims 30 and 57-58 are allowed.

Claim 33 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: with respect to the allowable subject matter, none of the prior art either alone or in combination disclose or teach of the claimed combination of limitations to warrant a rejection under 35 USC 102 or 103. Specifically, with respect to claims 30 and 57-58, none of the prior art either alone or in combination disclose or teach of the claimed projection optical system having the first and second imaging optical systems with the specific structure as claimed, and specifically including, as the distinguishing feature in combination with the other limitations, the claimed field lens unit having a positive power disposed between the claimed first and second field mirror. Specifically, with respect to claim 33, none of the prior art either alone or in combination disclose or teach of the claimed projection optical system having the first and second imaging optical systems with the specific structure as claimed, and specifically including, as the distinguishing feature in combination with the other limitations, the claimed field stop disposed at the




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position of the image for changing at least one of a size and a shape of an imaging region upon the image plane.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jordan M. Schwartz whose telephone number is (571) 272-2337. The examiner can normally be reached on Monday to Friday (8:00-5:30), alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps can be reached at (571) 272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jordan M. Schwartz  
Primary Examiner  
Art Unit 2873  
November 5, 2004